By the THEORY.			By OSERVATIONS.			
October.	Middle reduced to Greenwich.	Least dist. of Centers.	Middle reduced to Greenwich.	Diff. later in 46 years.	Least dist. of Centers.	Diff. more N. in 46 Years.
Years.	D. h. m. sec.	M. sec.	D. h. m. sec.	H. m. sec.	M. sec.	M. sec.
1st Transit 1631.	27. 19. 37. 55	3. 20	27. 19. 37. 55		3. 20	1. 18
+ 46	0. 4. 51	+ 1. 22 N.		4. 50. 5		
2d Transit 1677.	28. 0. 28. 55	4. 42	28. 0. 28. 0		4. 38	
+ 46	1. 4. 51	+ 1. 22 N.				1. 18
3d Transit 1723.	28. 5. 19. 55	6. 4	28. 5. 14. 30	4. 46. 30	5. 56	
+ 46	0. 4. 51	+ 1. 22 N.				1. 36
4th Transit 1769.	28. 10. 10. 55	7. 26	28. 10. 1. 52	4. 47. 22	7. 32	

THUS it appears, that the *OBSERVATIONS* do not quite agree with the *THEORY*; the latitude being increased by the last Transit about $\frac{1}{4}$ of a minute more north, than the Theory would give, and the time of the middle falling about 4′ too soon. Whether this can be accounted for from a re-examination of the observations themselves, or by any correction in the motion of ☿'s nodes, may be worthy of further enquiry.

The SUN'S PARALLAX *deduced from a comparison of the* NORRITON *and some other* American *Observations of the Transit of Venus,* 1769; *with the* GREENWICH *and other* European *Observations of the same. By* WILLIAM SMITH, *D. D. Provost Coll. Philad.*

ONE can scarcely enter upon this subject, without admiring the SAGACITY of the great *Dr.* HALLEY, who first conceived the method of ascertaining the Sun's parallax (that is, the angle which the Earth's semidiameter subtends at the Sun,) and consequently the dimensions of the whole solar system, either from the total duration of a transit of Venus, duly observed in one single place of the Earth properly situated, or from the difference of absolute time that elapses between the observations of the CONTACTS of the *Sun* and *Venus* in different places.

THE latter of these methods is what Astronomers in general prefer; yet, even in that, a concurrence of so many circumstances is requisite, that neither the former transit of 1761, nor, it is feared, this of 1769, will enable Astronomers to do justice to the Doctor's noble problem in all its parts. For it is necessary ——

First, THAT the different observers should have good Telescopes, Time-pieces well adjusted, and the latitude and longitude of their places of observation determined with the most scrupulous exactness.

Secondly,

Secondly, THAT the abſolute difference of time between the *Contacts*, at the different places to be compared with each other, be ſo great, as to render the unavoidable ſmall defects of inſtruments and obſervation inſignificant.

Thirdly, THAT all the obſervers be favored with a clear ſky, and the Sun of a ſufficient altitude, not leſs than 8°. or 10°. above the horizon.

GRANTING therefore, what I believe will not be denied, that all the circumſtances mentioned under the firſt head, concurred in favor of the American as well as European obſervations made uſe of in the following deduction of the Sun's parallax; yet the abſolute difference of time, being, on a mean, but about 3′. 4″, was ſcarce one fourth part of the greateſt abſolute difference that might be obtained from obſervations made at two places ſituated in the moſt favourable manner, with reſpect to each other.

BUT though this circumſtance did not concur in favor of the European and American obſervers, yet, if the Sun had been ſufficiently high to the former, and as reſplendent and well defined as he was to us, notwithſtanding the ſmall difference of abſolute time between our obſervations, his parallax might have been deduced from them, perhaps to as great exactneſs as ever it can be expected from a tranſit of Venus. For any two obſervers with us, having eyes and inſtruments equally good, and taking the ſame method of judging concerning any Phænomenon, could ſcarcely have differed more than 5″ or 6″; and where ſeveral obſervers were at one place, it is probable the mean of all, might have brought the time within the limits propoſed by Dr. Halley, that is within 2″ of the truth.

BUT ſcarce any of the European obſervers, in the following liſt, had the Sun above 8° high at the *external Contact*; and, at the *internal Contact*, in France and Sweden, he was ſcarce 2° above the horizon, and even at Greenwich not quite 5°. This Circumſtance therefore, and the form Venus put on, hanging to the Sun's limb by a ſort of protuberant ligament, muſt have rendered

rendered it very difficult to pronounce the moment of the internal contact. Moreover, the whole duration of the ingrefs, or time between the contacts, given by the European obfervers, being near 1′ longer than it was obferved in America, when it ought rather to have been fhorter, tends further to fhew that the true internal contact muft have been paft, before they faw the Sun's light compleated, round the dark body of the Planet.

AND here, as Dr. *Halley** expreffes it, "Since VENUS, "like her fex, is exceeding *coy*, and deigns but in certain ‖ "ages, to come before the eyes of men, divefted of her "borrowed drefs;" an American, who has the leaft of the fpirit of an Aftronomer in him, cannot help lamenting for his Brother-Aftronomers in Europe----men of fame and great abilities----that they were condemned, amid horizontal vapors, only to a tranfient glimpfe of this rare Phænomenon (*fpectaculum inter Aftronomica longe nobiliffimum*); and that they could not have fhared with us fome part, at leaft, of that *luxury of gazing*, which we enjoyed here.

HOWEVER, notwithftanding thefe unfavorable circumftances, the parallax of the Sun, as deduced from the beft obfervations of the tranfit 1761, will be greatly confirm'd by the following comparifons of the American and European obfervations of 1769; efpecially thofe of the external contacts, which on this occafion, perhaps, are only to be relied on. For a difturbance or alteration firft arifing on the Sun's limb, and that at a greater altitude, was certainly a circumftance that could be more eafily judged of as to time, than the completion of a fmall thread of the Sun's light, almoft in the horizon.

BUT, before I proceed to draw the conclufions, altho' it may be unneceffary to perfons verfed in aftronomical fubjects and calculations, yet to the generality of thofe who may be readers of

* Venus, *quamvis fyderum omnium fpeciofiffima, more fexus fui, fine mutuato cultu ac fplendore afcititio in confpectum prodire veretur: Hoc etenim fpectaculum, inter Aftronomica longe nobiliffimum, inftar ludorum fecularium, integri feculi mortalibus invident motuum arctæ leges.* Philof. Tranf. Vol. I. No. 100.

‖ Venus will not be feen on the Sun again, till the year 1874; fo that fcarce even the grand-children of the Obfervers of the laft Tranfit will fee the next.

of the Tranſactions of an American Philoſophical Society, and particularly the youth in our different ſeminaries of learning, it may be acceptable to ſhew the whole proceſs by which the concluſions are obtained, and how to calculate the effect which the parallaxes of *Venus* from the *Sun* have, both in latitude and longitude, with reſpect to the contacts here and in Europe.

IT need hardly be obſerved that the true place of a planet in the Heavens, Venus for inſtance, is that where ſhe would be ſeen if view'd from the center of the earth; and that unleſs ſhe be in the ſpectator's § zenith, her *apparent* place will be lower than her *true* place This difference of place is called the planet's parallax in altitude, and is meaſured in a vertical circle; being greateſt in the horrizon, and decreaſing as the altitudes increaſe, till in the zenith it becomes nothing. The method of determining the quantity of this parallax at different altitudes, and of reducing it into thoſe of latitude and longitude, ſo as to know their effect on the planet's place, is as follows.

LET V, (Plate III, Fig. 7,) be the place of the SUN and VENUS; Z V, a vertical circle; EC, the ecliptic; PVD, a circle of declination; OVN, part of the orbit of Venus; and C, the firſt point of Aries.

Then the following things are known, viz;
ZP, the co-latitude; VD, the declination; VP, its compliment; CV, the Sun's longitude; CD, the right aſcenſion; and ZPV, the hour angle from noon.

FROM theſe *data*, the parallaxes of Venus from the Sun, namely VL in the vertical, VN in longitude, and LN in latitude, may be found for any given place and time.

LET the place be NORRITON, at $2^h. 12'. 50''$, the moment of the firſt external contact.

THEN, in the ſpherical triangle ZVP, we have two ſides, and the included angle, viz.

o *h* ZP,

§ This matter being very well explained by Mr. *Benjamin Weſt*, in his account of the Providence Obſervations, P. 104, need not be repeated here.

ZP, $=49^{\circ}.50'.29''$, the co-latitude
VP, $=67.\ 34.\ 17$, the co-declination.
ZPV $=33.\ 12.\ 30=2^{h}.\ 12'.\ 50''$ the time turned into deg. &c.

Hence we get the angle ZVP	$=49^{\circ}.55'.\ 33''$
And the zenith diſtance of ☉'s center ZV	$=33\quad 9\quad 42\frac{1}{2}$
Subtract for ♀ higher than ☉'s center,	$15.\ 18$
Remains the zenith diſt. of ♀'s lower limb,	$32.\ 54.\ 24\frac{1}{2}$
Compliment of which is the height of ♀'s lower limb above the horizon,	$=57.\ 5.\ 35\frac{1}{2}$

ASSUMING now any number for the Sun's horizontal parallax on the Tranſit day, let us ſay $8'',5212$ (the nearer to the true parallax the better); then the horizontal parallax of Venus will be to that of the Sun, inverſely as their diſtances from the Earth; that is

$28887 : 101512 :: 8'',5212 : 29''.9444$ = the hor. parallax of ♀
Subtract Sun's parallax $=\ 8.\ 5212$

The Remainder $21.\ 4232$ = horizontal parallax of *Venus* from the *Sun* on the tranſit day.

THEN, Radius is to the Sine of the zenith diſt. of Venus, as her horizontal parallax from the Sun, is to her parallax at the altitude aforeſaid; viz.

Rad : S. $32^{\circ},54',24''\frac{1}{2} :: 21'',4232 : 11'',6387$ = LV $\left\{ \begin{array}{l}\text{the paral. of ♀ à ☉}\\ \text{in the vertical, at the}\\ \text{alt. } 57^{\circ}.\ 5'.\ 35''\frac{1}{2}.\end{array}\right.$

MOREOVER, in the right-angled ſpherical triangle CVD, we have two ſides, viz.
CV the Sun's longitude $=2^{s}.\ 13^{\circ}.\ 20'.\ 31''=73^{\circ}.\ 20'.\ 31''$.
DV the declination $=22^{\circ}.\ 25'.\ 43''$.

Whence we get CD $=71^{\circ}.\ 55'.\ 33''$.
And likewiſe the meridian angle CVD $=82^{\circ}.\ 54'.\ 21''$.

THE next thing to be found is OVE, or CVN, the angle of the viſible way, which is got as follows. Let ♀ ☊ ⊖ (Plate III. Fig. 9,) be the inclination of the orbit of ♀ with th ecliptic $=3^{\circ}.\ 23'.\ 20''$. Let ⊖ ☊ be ☉'s horary motion, with the menſtrual equation, as from Mayer's tables $=143'',53$;
and

and ♀ ☋ the horary motion of ♀ as seen from ☼, taken from Halley's tables =238″,334. Then, by trigonometry, the angle ☋ ⊖ ♀ will be found =171°. 30′. 35″; the compliment of which ♀ ⊖ A, is the angle of the visible way =8°. 29′. 25″. *

The side ♀ ⊖ is the horary motion of ♀ á ⊖ as seen from the Sun =95″,418; which encreased in the Ratio of ♀'s distance from ⊖, to her distance from ☼, gives her horary motion in the visible way =239″,891.

Now, returning to fig. 7; we had got the meridional angle CVD,		= 82°. 54′. 21″
But we had before ZVP, or DVL =	49°. 55′. 33″	
And we have now got the angle of the visible way, CVN,	= 8. 29. 25	=58. 24. 58
Subtr. their sum from CVD, and we have LVN,		=24. 29. 23

WHEREFORE, in the right-angled triangle LNV (which being small may be resolved as a plain triangle) having found one angle LVN and the hypothenuse LV, we get the remaining sides, viz.

VN the parallax in longitude =10″. 592.
LN the parallax in latitude = 4. 8245.

Now the parallax of longitude VN contributes to accelerate the contact of Venus and the Sun, by its whole length; but the parallax of latitude LN contributes to accelerate the same by a space different from its whole length.

THERE are several ways of explaining this matter, and of converting the space LN into a proportionable part for acceleration. The following method, given by Mr. Rittenhouse, is that which we made use of, and is as plain and strictly mathematical as any.

"LET S (plate III. fig. 6) be the center of the Sun and of the cicle ABC, whose radius =975″ the sum of the semidiameters of the Sun and Venus. Let D L o be the true transit line, and *D the place of Venus's center* at the time of the external contact, as seen from the Earth's center; and B its place as seen from

* This angle, in the Norriton account of the Transit, page 31, was called 8°. 28′. 27″, that is near 1′ less; the side ⊖ ☋ being computed from Halley's tables, not having Mayer's tables at that time.

any part on the ſurface of the Earth, ſuppoſe Greenwich. Make B E perpendicular to D o; then will D E be the parallax in longitude, and E B in latitude; and D L ſhall be the whole ſpace by which Venus is brought ſooner into contact with the Sun to a ſpectator at Greenwich, than as ſeen from the center of the Earth.

" Now if the parallax of longitude only took place, the center of Venus would be removed thereby only along her true path from D to E, and ſo the tranſit would not yet be begun. But the parallax of latitude E B makes her center appear to be removed in another direction from E to B, and brings her to touch the Sun's limb by the ſpace E L ſooner than if only the parallax of longitude took place. The length of this ſpace E L, (which is here leſs than E B) may be determined as follows.

" Having aſſumed the Sun's horizontal parallax as before, it follows from the Norriton obſervations, that the leaſt diſtance of the centers of the Sun and Venus, as ſeen from the Earth's center, was 610″. Make, therefore, o S =610″, perpendicular to D o r; and o m = half the parallax of latitude BE, calculated as above for the given place. Draw m I, parallel to o L; join S I, which ſhall be perpendicular to B L. Make S p, perpendicular to S I, or parallel to BL. Then the triangles B E L, I m S, are ſimilar; for they are both ſimilar to S m p; whence I m : m S :: B E : E L. But m S, =610−m o, half the parallax of latitude already found; and $\sqrt{S\,I^2 - m\,S^2} = m\,I$. Thus, the three firſt terms of the proportion being known, the fourth E L is known alſo.

" In like manner let F be the geocentric place of Venus's center, and H its place as ſeen at Norriton at the time of the external contact. Draw HG perpendicular to DLo. Then FG will be the parallax of longitude, and GH of latitude. Make o n= half the parallax of latitude found above. Draw q n K parallel to DLo. Join SK which ſhall be perpendicular to H L. Then the triangles FHG, KSn are ſimilar; and Kn : nS :: HG : GL. Thus GL may be found. Let us, for an Example, take Norriton.

HG,

HG the parallax of latitude (under the denomination of LN) was already found $=4'',8245$; whence $\frac{HG}{2}=2'',4122=on$. And $oS-on=nS$; that is $610''-2'',4122=607'',5878=nS$. Moreover $\sqrt{SK^2-nS^2}=Kn$; That is $\sqrt{975^2-607,5878^2}=762'',536=Kn$. Wherefore since $Kn:nS::HG:GL$; we have $762'',536:607'',5878::4'',8245:3'',8432=GL$.

	seconds.
THUS the parallax of latitude $HG=4'',8245$ accelerates the contact only by GL	$=3,8432$
To which add the parallax of longitude EG, found above for Norriton	$=10,592$
And we have the whole space FL by which the contact is hastened at Norriton, by the parallaxes both of longitude and latitude	$=14,4352$

Now as the motion of ♀ in an hour is $239'',891$; she will require $216'',624$ of time, to pass over the above parallactic space of $14'',4352$. And by so much will the external contact be accelerated at Norritonin time; viz. $216'',624$.

BY the like process for Greenwich, (using fig. 8, where we had fig. 7 before), we shall find the whole parallactic space, $DL=27'',0441$

which gives in time $=405'',846$ for the acceleration of ext. contact at Greenwich.

But, 216,624 was the acceleration at Norriton.

THE difference $189'',222$, is the absolute time, by which the external contact should have been seen sooner at Greenwich than at Norriton, if the Sun's horizontal parallax were truly assumed $=8'',5212$ on the transit day.

But at Norriton the ext. contact was observed, at	$2^h.\ 12'.\ 50''$
Add for the diff. of merid. of Greenw. & Norriton,	5. 1. 29
The Sum gives the time for Greenwich, if there were no parallax,	7. 14. 19
But the contact was observed at Greenwich, at	7. 11. 2
The difference is the observed effect of parallax, -	$=3.\ 17=197''$

BUT

But this *observed* effect 197″ is greater than the calculated effect 189″,222; and therefore the Sun's true parallax on the transit day is (by this comparison) greater than the parallax assumed for the calculation, and will be found 8″,8715.

For 189″,222 : 197″ :: 8″,5212:8″,8715.

In like manner, for the internal contacts, after computing the parallaxes of ♀ à ☉ in long. and lat. for the respective places and times of observation, agreeable to the foregoing rules, the parallaxes in latitude were reduced to their proportionable spaces for acceleration, by taking the difference of the semidiameters of ☉ and ♀ =918″ for the radius of the circle (Plate III, Fig. 6) instead of their sum =975″. In all other respects the operation is the same as for the external contacts.

So far concerning the necessary preparations. The following Table contains the names of places, their latitudes and longitudes, and such other requisites as enter into the comparisons for deduceing the Sun's parallax from the observations.—

Names of Places.	Latitude North	External Contact. Longitude from Greenwich	in Time from Norriton.	1st. ext. cont. app. time	Numb. of observers	Calculated acceleration, in time, by Par.
		h. m. sec.	h.m.sec.	h. m. sec.		
Greenwich	51°.28′. 37″	0. 00. 00	5.1. 29 E	. 11. 2	6	405″.846
Spital Square	51. 31. 15	0. 00. 17 W.	5.1. 12	7. 10. 44¼	1	405. 852
Middle Temple	51. 30. 50	0. 00. 25 W.	5.1. 4	7. 11. 5¾	1	405. 841
Kew	— — —	0. 1. 14 W.	5.0. 15	7. 9. 59	1	405. 755
Windsor Castle	51. 28. 15	0. 2. 24½ W	4.59.4 ½	7. 8. 30	1	405. 664
Shirburn Castle	51. 39. 22	0. 3. 57 W.	4.57.32	7. 7. 4	1	405. 452
Oxford	51. 45. 15	0. 5. 4 W.	4.56.25	7. 5. 58	5	405. 236
Glasgow	55. 51. 32	0. 17. 11 W.	4 44.18	6. 54. 29	3	400. 867
Upsal	59. 51. 50	1. 10. 46 E.	6.12.15	8. 22. 9½	3	398. 632
Stockholm	59. 20. 30	1. 12. 26 E.	6.13.55	8. 24. 1	3	399. 388
Mean	— — —	— — —	5,12.44,95	7. 22. 30,25		403 853
Norriton	40. 9. 31	5. 1. 29W.	0.00.00	2. 12. 50	2	216. 624
			Diff.	5. 9.40,25	—	187,229

Thus subtracting the time of the external contact at *Norriton*, from the mean of the ten external contacts in the above table, we have 5h. 9′.40″,25 for the mean diff. of longitude by the observations. But the true mean diff. of long. is 5h. 12′. 44″,95. The difference of these two =3′, 4″,7=184″,7 is the mean observed effect of parallax. But the mean calculated effect =187″,229.

Whence 187″,229 : 184″,7 :: 8″,5212 : 8″,406. Thus, by one single comparison of the *Mean* of the above ten observations with the Norriton observation, we get the Sun's

Sun's parallax on the transit day =8″,406, agreeing to the last decimal place with what is got by making all the comparisons separately, and taking the mean of the results, as in the following table. It would therefore have been needless to enter down these separate comparisons, if it were not to see how they differ from each other, and which (if any) ought to be rejected.

Norriton and Greenwich.			*Norriton and Spital Square.*		
H. m. sec.	seconds.		H. m. sec.	seconds.	
2. 12. 50 *Norriton.*	405,846 *Greenw.*		2. 12. 50 *Norriton.*	405,852 *Spital Sq.*	
5. 1. 29=diff. of merid.	216,624 *Norriton.*		5. 1. 12=*diff. merid.*	216,624 *Norriton*	
7. 14. 19	189,222		7. 14. 2	189.228	
7. 11. 2 *Greenwich.*		+7″,778	7. 10. 44¼ *Spital Square.*		+8″.522
3. 17=197″			3. 17¾=197″,75		
Sun's Parallax=8″,8715			Sun's Parallax=8″.9055.		
Norriton and Middle Temple.			*Norriton and Kew.*		
2. 12. 50 *Norriton.*	405,841 *M.Temple.*		2. 12. 50 *Norriton.*	405,755 *Kew.*	
5. 1. 4=diff. merid.	216,624 *Norriton.*		5. 0. 15=diff. merid.	216,624 *Norriton.*	
7. 13. 54	189,217		7. 13. 5	189,131	
7. 11. 5¾ *Mid. Temple.*		—20″,967	7. 9. 59 *Kew.*		—3″,131
2. 48¼=168″,25			3. 6=186″.		
Sun's Parallax=7″,5776.			Sun's Parallax=8″,3804.		
Norriton and Windsor Castle.			*Norriton and Shirburn Castle.*		
2. 12. 50 *Norriton.*	405,664 *Windsor.*		2. 12. 50 *Norriton.*	405,452 *Shirb.Cast.*	
4. 59. 4½=diff. merid.	216,624 *Norriton.*		4. 57. 32=diff. merid.	216,624 *Norriton.*	
7. 11. 54½	189,04		7. 10. 22	188,828	
7. 8. 30 *Windsor.*		+15″,46	7. 7. 4 *Shirb. Cast.*		+9″,172
3. 24½=204″,5			3. 18=198		
Sun's Parallax=9″,2181.			Sun's Parallax=8″,9351.		
Norriton and Oxford.			*Norriton and Glasgow.*		
2. 12. 50 *Norriton.*	405,236 *Oxford.*		2. 12. 50. *Norriton.*	400,867 *Glasgow.*	
4. 56. 25=diff. merid.	216,624 *Norriton.*		4. 44. 18=diff. merid,	216,624 *Norriton.*	
7. 9. 15	188,612		6. 57. 8	184,243	
7. 5. 58 *Oxford.*		+8″,388	6. 54. 29 *Glasgow.*		—25″,243
3. 17=197″			2. 39=159″		
Sun's Parallax=8″,9002.			Sun's Parallax=7″,3537.		
Norriton and Upsal.			*Norriton and Stockholm.*		
2. 12. 50 *Norriton.*	398,632 *Upsal.*		2. 12. 50 *Norriton.*	339,388 *Stockholm.*	
6. 12. 15=diff. merid.	216.624 *Norriton.*		6. 13. 55=diff. merid.	216,624 *Norriton.*	
8. 25. 5	182,008		8. 26. 45	182,764	
8. 22. 9 *Upsal*		—6″,008	8. 24. 1 *Stockholm.*		—18″,764
2. 56=176″			2. 44=164″		
Sun's Parallax=8″,2399.			Sun's Parallax 7″,6464.		

MEAN of the WHOLE 8″,403.

INTERNAL CONTACT.

Names of Places	Reg. circumf. in contact	Number of observers	Long. in time, from Norriton.	Cacul. acceleration, in time, by Parallax.	Thread of light compleat.	Number of observers	Long. in time, from Norriton.	Cal. acceleration in time by parall.
	h.m. sec.		h.m.sec.	seconds	h.m. sec.		h.m.sec.	seconds
Greenwich	7.28.31	3	5. 1.29 E.	423,821	7.29.18	6	5. 1.29 E.	424,786
Spital Square	— — —	—	— — — —	— —	7.29.15¼	1	5. 1.12	424,741
Middle Temple	— — —	—	— — — —	— —	7.28.49½	1	5. 1. 4	424,701
Kew	— — —	—	— — — —	— —	7.28.17	1	5. 0.15	424,454
Windsor Castle	— — —	—	— — — —	— —	7.26.37	1	4 59. 4½	424,221
Shirburn Castle	— — —	—	— — — —	— —	7.25.24	3	4.57 32	424,103
Oxford	— — —	—	— — — —	— —	7.24.20	7	4.56.25	423,956
Glasgow	— — —	—	— — — —	— —	7.12.15	3	4.44.18	421,01
Upsal	8.39.54	3	6.12.15	418,247	8.40.16	5	6.12.15	418,947
Stockholm	8.41.17	2	6.13.55	416,769	8.41.47	3	6.13.55	417,275
Mean,	8.16.34	- -	5.49.13	419,6123	7.40.37,c	- -	5.12.44,95	422,317
Norriton,	2.30. 6	3	- - - -	238 - -	2.30.26	2	- - - - -	238,975
Diff.	5 46.28	-	- - - -	181,6123	5.10.11,8	- -	- - - - -	183,842

Thus the true mean diff. of meridians of *Norriton* and the three places where the reg. circumferences are noted in contact, is — H. m. sec. 5. 49. 13

But the mean diff. of meridians, by the observations, is — — — 5. 46. 28

The diff. of these two, is the mean observed effect of parallax, — — =2. 45=165″

But the mean calculated effect of parallax, is — — — — 181″,6123

And, 181″,6123 : 165″ : : 8″,5212 : 7″,742.

Whence, 7″,742=☉'s parallax.

In like manner, for the ten places, which noted the completion of the thread of light, for the Internal Contact; we have—

	H. m. sec.
M. diff. merid.	5. 12. 44,95
But, by the observations, the mean diff. merid. is	5. 10. 11,8
The diff. of these two, is the mean observed effect of parallax,	0. 2. 33,15=153″,15
But the mean calculated effect of par. is — — —	183″,842

And,

183″,84 : 153″,15 : : 8″,5212 : 7″,08

Whence, 7″,08=☉'s parallax.

Both these Results are the same as the *Mean* Results of their respective Classes, got by the separate Comparisons in the following Table.

Internal

INTERNAL CONTACT.

Comparisons from the regular Circumferences in Contact.

Norriton and Greenwich.

H. m. sec.		seconds.	
2. 30. 6.	*Norriton.*	423,821	*Greenwich.*
5. 1. 29.=diff. merid.		238.	*Norriton.*
7. 31. 35.		185,821	
7. 28. 31.	*Greenwich.*	—1'',821	
3. 4=184''.			

Sun's Parallax=8'',44.

Norriton and Upsal.

H. m. sec.		seconds.	
2. 30. 6.	*Norriton.*	418,247	*Upsal.*
6. 12. 15.=diff. merid.		238,---	*Norriton.*
8. 42. 21.		180,247	
8. 39. 54.	*Upsal.*	—33'',247	
2. 27=147''.			

Sun's Parallax=6'',95.

Norriton and Stockholm.

2. 30. 6.	*Norriton.*	416,769	*Stockholm.*
6. 13. 55=diff. merid.		238,---	*Norriton.*
8. 44. 1.		178,769	
8. 41. 17.	*Stockholm.*	—14'',605.	
2. 44.=164''.			

Sun's Parallax=7'',82.

The MEAN of these three comparisons gives the Sun's Parallax 7'',74.

Comparisons from the Completion of the Thread of Light.

Norriton and Greenwich.

H. m. sec.		seconds.	
2. 30. 26.	*Norriton.*	424,768	*Greenwich.*
5. 1. 29=diff. merid.		238,975	*Norriton.*
7. 31. 55.		185,793	
7. 29. 18.	*Greenwich.*	—28'',793.	
2. 37=157''.			

Sun's Parallax=7'',2006.

Norriton and Spital Square.

H. m. sec.		seconds.	
2. 30. 26.	*Norriton*	424,741	*Spital Sq.*
5. 1. 12.=diff. merid.		238,975	*Norriton.*
7. 31. 38.		185,766	
7. 29. 15¼	*Spital Sq.*	—43'',016	
2. 22¾=142'',75.			

Sun's Parallax=6'',548.

Norriton and Middle Temple.

2. 30. 26.	*Norriton.*	424,701	*Mid. Temple.*
5. 1. 4.=diff. merid.		238,975	*Norriton.*
7. 31. 30.		185,726	
7. 28. 49¾	*Mid. Temple.*	—25'',476	
2. 40¼=160'',25.			

Sun's Parallax=7'',3523.

Norriton and Kew.

2. 30. 26	*Norriton.*	424,454	*Kew.*
5. 0. 15=diff. merid.		238,975	*Norriton.*
7. 30. 41		185,479	
7. 28. 17	*Kew.*	—41'',479	
2. 24=144''			

Sun's parallax 6'',6156.

Norriton and Windsor.

2. 30. 26	*Norriton.*	424,221	*Windsor.*
4. 59. 4½=diff. merid.		238,975	*Norriton.*
7. 29. 30½		185,246	
7. 26 37½	*Windsor.*	—12''246	
2. 53=173''.			

Sun's Parallax=7'',9579.

Norriton and Shirburn Castle.

2. 30. 26	*Norriton.*	424,103	*Shirb. Cast.*
4. 57. 32=diff. merid.		238,975	*Norriton.*
7. 27. 58		185,128	
7. 25. 24	*Shirb. Cast.*	—31'',128	
2. 34=154''.			

Sun's Parallax 7'',0846.

O i

Norriton

Norriton and Oxford.

H. m. sec.		seconds.	
2. 30. 26	*Norriton.*	423,95	*Oxford.*
4. 56. 25	=diff. merid.	238,975	*Norriton.*
7. 26. 51		184,975	
7. 24. 20	*Oxford.*	—33″,975	
2. 31=151.			

Sun's Parallax=6″,9561.

Norriton and Glasgow.

H. m. sec.		seconds.	
2. 30. 26	*Norriton.*	421,01	*Glasgow.*
4. 44. 18	=diff. merid.	238,975	*Norriton.*
7. 14. 44		182,035	
7. 12. 15	*Glasgow.*	—33″,035	
2. 29=149″.			

Sun's Parallax=6″,9748.

Norriton and Upsal.

2. 30. 26	*Norriton.*	418,947	*Upsal.*
6. 12. 15	=diff. merid.	238,975	*Norriton.*
8. 42. 41		179,972	
8. 40. 16	*Upsal.*	—34″,972	
2. 25=145″.			

Sun's Parallax=6″,8654.

Norriton and Stockholm.

2. 30. 26.	*Norriton.*	417,275	*Stockholm.*
6. 13. 55	=diff. merid.	238,975	*Norriton.*
8. 44. 21.		178,3	
8. 41. 47.	*Stockholm.*	—24″,3.	
2. 34=154″.			

Sun's Parallax=7″,3599.

MEAN of the above TEN, 7″,09.

LET us next see what parallax of the Sun will be got from the Philadelphia observations, compared with those made at the ten places above specified; wherein a single comparison will be sufficient, since the result will be the same, as from a mean of the ten comparisons made separately.

PHILADELPHIA, and *Ten* Places in *EUROPE*.

EXTERNAL CONTACT.

H. m. sec.		seconds.	
2. 13. 46,6	Philadelphia mean of 5 observ.	403,853	mean parallax for the 10 places.
5. 11. 52,95	=mean diff. merid.	215,12	parallax for Philadelphia.
7. 25. 39,55	=time for the 10 places without parallax.	Diff. 188,733	=calculated effect of parallax.
7. 22. 30,25	=mean of the observed times.		+ 0″,567.

Diff. 3. 9,3=189″,3=mean observed effect of Parallax.
Whence, 188″,733 : 189″,3 : : 8″,5212 : 8″,5468=☉'s Parallax on Transit Day

INTERNAL CONTACT.

H. m. sec.		seconds.	
2. 31. 28	Philadelphia mean of 5 observ.	422,817	mean parallax for the 10 places.
5. 11. 52,95	=mean diff. merid.	237,94	parallax for Philadelphia.
7. 43. 20,95	=time for the 10 places without parallax.	Diff. 184,877	=calculated effect of parallax.
7. 40. 37,8	=mean of the observed times.		—21″,727.

Diff. 2. 43,15=163″,15=mean observed effect of parallax.
Whence, 184″,877 : 163″,15 : : 8″,5212 : 7″,5198=☉'s Parallax on Transit Day

Thus

Thus, by the *External Contact*, we have the Sun's Parallax—

	seconds.
From the Philadelphia Observations	8,5468
And from the Norriton Observations	8,4060
	16,9528

The MEAN of both is, $\frac{16,9528}{2} = 8'',4764$.

In like manner, by the *Internal Contact*, we have the Sun's Parallax—

	seconds.	
From the Norriton observations,	7,74	comparison, reg. circumf. in contact.
	7,08	comparison, thread of light compleat.
From Philadelphia observations,	7,52	comparison, thread of light compleat.
	22,34	

The MEAN of these is $\frac{22,34}{3} =$ *$7'',447$

Now the *mean* parallax thus got by the comparison of all the ten external contacts in the above table, with those of Philadelphia and Norriton, being 8″,4764 on the transit day, is nearly the same that was got by the best observations in 1761, and gives 8″,6045 for the Sun's horizontal parallax at the mean distance. And there is reason to think, that this is as large as perhaps any good observations will give it.

BUT the Astronomer Royal writes me, that he has undertaken the final settlement of this matter; and, no doubt, he has several observations (whereon to found comparisons) that have not come to our hand, and will likewise consider every nicety that can enter into this truly delicate calculation, making the proper allowances for the difference of Telescopes, &c. I therefore thought it needless to be very particular in my comparisons, and contented myself with those places whose latitude and longitude could be well depended on, and where the sky was clear, and the Sun any tolerable height above the horizon. Indeed, some of the ten places in the above table ought, perhaps, to be rejected. The longitude of Glasgow, for instance, does not seem fully determined. For the eclipses of Jupiter's Satellites, observed there by Dr. Wilson, would give the longitude different from what the Doctor calls it in his account of the transit. If that observation were left out, the mean parallax would come out a small fraction larger by the external contact.

As to the parallax deduced from the internal contact, viz. 7″,447 on the day of the transit, I think no dependence can be placed upon it, for the reasons given above. For,

O i 2 unless

* *In the comparisons with the Greenwich internal contacts, the observation of Mr.* Dunn, *as differing so considerably from the rest, was left out; but in those of the external contact, it was included. If it be included at the internal contact also, the* mean *of the whole will be* 7″,362, *instead of* 7″,447.

unleſs our *internal contacts* had all been noted about 22″ later, they would not give the ſame quantity of parallax as the external contacts. And the truth of obſervation would by no means permit us to lengthen out our internal contacts ſo much; for, in 22″ after the times noted by us, Venus appeared not only ſurrounded wholly by the Sun's light, but a conſiderable way within his diſc. And indeed the Aſtronomers in Europe, ſeem ſenſible of the little dependence that can be placed on obſervations made ſo near the horizon, as thoſe of the int. cont.

Monsieur *Ferner* writes from Stockholm, that he is more ſurprized that "the times of the contacts ſhould agree ſo well "together than he is at their difference. For the nearneſs of "the Sun to the horizon, and the extraordinary quantity of "vapors with which the atmoſphere was loaded, not only "cauſed the limb of the Sun to tremble and undulate, but "gave it, as it were, the form of a large ſaw, the eminences "being luminous, and the cavities black, which ſhifted "places like a tempeſtuous ocean." Theſe things made it difficult to fix even the time of the *external contact* to greater certainty than 5 or 6 ſeconds; but, at the internal contact, he found difficulties of another kind. For "when he thought "Venus ought to be entirely within the Sun, the luminous "cuſps did not join immediately behind her; but on the contrary, ſhe ſeemed to carry the limb of the Sun along with "her, which appeared to bend towards her, leaving a black "cavity in his limb; and the body of the planet, though he "thought he ſaw it all within the Sun, ſtill ſhot out a black "column or ligament towards his limb."

It was intended to have compared all the other American Obſervations (as well as thoſe of *Norriton* and *Philadelphia,)* with the European Obſervations, for deducing the Sun's parallax; but I could only find leiſure to make the calculations for two places more, viz the Capes of Delaware, and Baſkenridge, New-Jerſey. Mr. *Biddle*'s external contact at the Capes, compared with the *ten* places above, gives 9″,254 for the Sun's parallax on the tranſit day; and deducting 8″ of time, by which he thinks he noted his internal contact too late, on account of the tremulous motion on the Sun's limb, occaſioned by the denſe vapors from the ſea, that contact gives 8″,862. The external contact (obſerved at Baſkenridge, by Lord Stirling) gives, on a like compariſon 7″,756, and his internal contact 8″,1668.

His

HIS Lordſhip has not yet had an opportunity to aſcertain the longitude of Baſkenridge with the neceſſary preciſion; and the contacts by Mr. Biddle being about 16″ later, than they ought to be from his difference of longitude (allowing for parallax) compared with Philadelphia and Norriton; he apprehends that the time of his clock could not be depended on nearer than to about one quarter of a minute, having only a very ſmall equal Altitude Inſtrument mounted on a Theodolite, to regulate by, and the wind very high on June 2d. In other reſpects, there cannot be the leaſt doubt of the accuracy of his obſervations, having an excellent Teleſcope, and acknowledged abilities for the uſe of it; nor can there be an uncertainty of ſo much as 3″ of time in the longitude of his Obſervatory, in reſpect to the places abovementioned.

NEVERTHELESS, if the parallax of the Sun deduced from theſe two obſervations of the external contact, be joined with thoſe of Norriton and Philadelphia, and the mean of all the four be taken, it will give 8″,4907 for the Sun's parallax on the tranſit day, agreeing exceedingly near with what was got before by the compariſon from the Philadelphia and Norriton external contacts, viz. 8″,4764.

THERE is one ſmall nicety, which the extreme ſtrictneſs of the modern Aſtronomy might have required to be taken into the foregoing calculations; and which was not thought of in time. In the hypotheſis of the Earths being an oblate ſpheroid, the true latitude of places is more ſouth than the apparent latitude, or that deduced from obſervations.

Thus, the calcul. were made with lat. 40°. 9′.31″ for Norriton.
But, on account of the ſpheroidal figure of the Earth, ſubtract, 0. 14. 38

Remains the true latitude, that ſhould have been uſed in the calculation, = 39. 54. 53

In like manner the latitude for Greenwich ſhould be 51°. 14′. 19″, inſtead of 51°. 28′. 37″.

MOREOVER the horizontal parallax aſſumed in the calculations, being to be conſidered as the equatoreal parallax, ſhould bear a ſmall reduction likewiſe for different latitudes.

WITH this reduction, therefore, both of latitude and parallax, the calculations for Greenwich and Norriton were repeated, and the Sun's parallax came out, for the external contact 8″,805, instead of 8″,8715. The difference is so small, that it was not thought worth while to repeat any more of the calculations on that account; especially as the final determination of the Sun's parallax, from the late transit, as was hinted already, will not be left to depend on our calculations in America. I should have been glad, if time had permitted, to have gone over the work a second time, to be sure of its correctness. Some of the calculations were made by Mr. Rittenhouse and myself jointly, and of the residue, made by myself singly, which were the greatest part, we have here and there selected out some for re-examination. And though, among such a multitude of figures, as necessarily entered into these calculations, it is difficult to avoid mistakes wholly, either in Writing or Printing, yet I think, there can be none of any significancy.

METEOROLOGICAL OBSERVATIONS *made at Philadelphia, in December, 1770; and in January, and part of February, 1771. By* THOMAS COOMBE, *Esqr. Communicated by Dr.* SMITH.

THOUGH part of the following Observations ought not, in the order of time, to come into this Volume, yet the singular *moderation* of the weather, for more than ten weeks of what is usually the severest part of our North-American winters, makes it proper not to separate observations which many people will wish to preserve entire, for a comparison with future winters, when we shall be favored with any of the like mildness.

DECEMBER, 1770.

Days.	Hours.	Barom.	Therm. *Fahrenh.* op. air.	in d.	Wind.	Weath.
1	9 a.m.	30. ½			n.	clou.
	2 p.m.	29. 9¾	39		n. w.	do.
2	9 a.m.	30. 1	27	32	ditto.	fair*
	2 p.m.	30. - -	30	32	ditto.	clou.
3	9 a.m.	30. 2	26	29	ditto.	fair
	2 p.m.	30. 1½	33	33	w.n.w.	do.
4	9 a.m.	30. ¾	28	32	s. w.	do.
5	9 a.m.	29. 9½	35	35½	w.	clou.
6	9 a.m.	29. 6½	38	40	ditto.	do.
	2 p.m.	29. 7½	43½	43½	n. w.	do.
7	9 a.m.	30. ½	31	36	ditto.	fair
	2 p.m.	29. 9½	36½	36½	n.	do.
8	9 a.m.	29. 8	35	37	w.	do.
9	8 a.m.	29. 9	33	36	s. w.	do.
10	8 a.m.	29. 8½	36	40	ditto.	do.
	2 p.m.	29. 8¾	46	46	ditto.	do.
11	9 a.m.	30. ¼	38½	41	n. e.	clou.
	2 p.m.	29. 9		41	ditto.	do. §
12	9 a.m.	29. 8	43	43	n.	do.
	2 p.m.	29. 7¾	43	43	ditto.	do.
13	9 a.m.	29. 8⅓	35½	41	n. w.	snow
	2 p.m.	29. 9	38	41	ditto.	clou.

Days.	Hours.	Barom.	Therm. *Fahrenh.* op. air.	in d.	Wind.	Weath.
14	9 a.m.	30. 2½			n. w.	fair†
	2 p.m.	30. 2½	39	39	w.	do.
15	9 a.m.	30. 2½	30	33		do.
16	9 a.m.	30. ½	39	41	s. w.	do.
	2 p.m.	29. 9½		44½	ditto.	do.
17	9 a.m.	29. 8½	42	42	w.	clou.
	2 p.m.	29. 9¾	45	46	n. w.	do.
18	9 a.m.	30. 2¾	37	43½	ditto.	do.
	2 p.m.	30. 2½	44	44	s. w.	fair
19	9 a.m.	29. 9½	40	45	w.	clou.
	2 p.m.	29. 9	49	48	n. w.	☼ *sh.*
20	9 a.m.	29. 8	37	42	w.	fair
21	9 a.m.	29. 1½	43	45	s. w.	rain.
	2 p.m.	29. 1½	47	47	w. *by* s.	clou.
22	9 a.m.	29. 5½	32	35	n. w.	w. &
	2 p.m.	29. 6½	34½	36	ditto.	clou.
23	9 a.m.	29. 6½	32	36	n. e.	snow
	2 p.m.	29. 6½	34	37½	n. n. e.	clou.
24	9 a.m.	30. ½	27	32	s. w	do.
	2 p.m.	30. ½	31	32	n. w.	do.
25	9 a.m.	30. 1½	28	32	n.	do. ‖
	2 p.m.	30. 1⅓	31	31½	n.w.	do.

* *Snow the preceeding night.* § *Rain at times.* † *A sharp frost in the night.*
‖ *Snow in the night.*

Continued, for December, 1770,

Days.	Hours.	Barom.	Therm. *Fahrenh.* op. air.	Therm. *Fahrenh.* in d.	Wind.	Weath.
26	9 a.m.	30. $3\frac{1}{2}$			ſ. w.	fair
	2 p.m.	30. $3\frac{1}{2}$	31	$31\frac{1}{2}$	w.	do.
27	9 a.m.	30. $3\frac{3}{4}$	31	32	n. e.	do.
28	9 a.m.	30. $3\frac{1}{2}$	29	$33\frac{1}{2}$	ditto.	do.
	2 p.m.	30. $3\frac{1}{2}$	36	$37\frac{1}{2}$	n.	do.

Days.	Hours.	Barom.	Therm. *Fahrenh.* op. air.	Therm. *Fahrenh.* in d.	Wind.	Weath.
29	9 a.m.	30. $2\frac{1}{4}$			w.	fair
30	9 a.m.	30. $\frac{1}{2}$	34	$36\frac{1}{2}$	ditto.	do.
	2 p.m.	30. $\frac{1}{2}$		42	ſ. w.	do.
31	9 a.m.	29. $8\frac{3}{4}$	37	37	n. e.	rain
	2 p.m.	29. $7\frac{3}{4}$	41	41	ditto.	clou.

JANUARY, 1771.

Days.	Hours.	Barom.	Therm. *Fahrenh.* op. air.	Therm. *Fahrenh.* in d.	Wind.	Weath.
1	9 a.m.	30. $\frac{1}{4}$			n. w.	clou.‡
	2 p.m.	30. $1\frac{1}{2}$	$38\frac{1}{2}$	39	n. n. e.	do.
2	9 a.m.	30. $3\frac{1}{3}$	31	$35\frac{1}{2}$	n. w.	fair *
	2 p.m.	30. $2\frac{1}{3}$	37	$37\frac{1}{2}$	ſ. w.	do.
3	9 a.m.	29. $9\frac{3}{4}$	35	$37\frac{1}{2}$	n. w.	rain
	2 p.m.	29. $8\frac{1}{2}$	39	41	ſ. w.	clou.
4	9 a.m.	29. $7\frac{3}{4}$	39	$41\frac{1}{2}$	ſ. w.	fair
	2 p.m.	29. 8	44	44	w.	do.
5	9 a.m.	29. 8	35	39	ſ. w.	do.
	2 p.m.	29. $7\frac{3}{4}$	45	$43\frac{1}{2}$	w.	do.
6	9 a.m.	30. $3\frac{7}{8}$	$33\frac{1}{2}$	$38\frac{1}{2}$	n. e.	do.
	2 p.m.	30. $3\frac{7}{8}$	37	$36\frac{1}{2}$	n.	do.
7	9 a.m.	30. $1\frac{1}{3}$	$32\frac{1}{2}$	36	n. e.	do.
	2 p.m.	30. $\frac{1}{2}$	37	$37\frac{1}{2}$	n.	clou.
8	9 a.m.	30. $2\frac{1}{2}$	$30\frac{1}{2}$	34	n. n. e.	fair
	2 p.m.	30. $2\frac{1}{2}$	36	36	n. n. e.	do.
9	9 a.m.	30. $\frac{1}{3}$	30	$31\frac{1}{2}$	n. e.	clou.
	2 p.m.	29. $8\frac{1}{2}$	40	$41\frac{1}{2}$	ſ.	do.
10	9 a.m.	29. 8	36	37	ſ. w.	fair
11	9 a.m.	30. $\frac{1}{2}$	34	36	n. w.	do.
	2 p.m.	30. $\frac{1}{2}$	46	45	w.	do.
12	9 a.m.	29. $9\frac{7}{8}$	$43\frac{1}{2}$	44	ſ. w.	do.
	2 p.m.	29. $9\frac{1}{4}$	$52\frac{1}{2}$	$54\frac{1}{2}$	ſ. w.	clou.
13	9 a.m.	29. 8	43	49	w.	rain
	2 p.m.	29. $6\frac{1}{4}$	42	$46\frac{1}{2}$	n. w.	clou.†
14	9 a.m.	30. $2\frac{1}{2}$	25	$33\frac{1}{2}$	n. w.	fair
15	9 a.m.	30. 3	28	32	n.	do.
	2 p.m.	30. 3	35	$35\frac{1}{2}$	ſ. w.	clou.
16	9 a.m.	30. $1\frac{1}{4}$	$42\frac{1}{2}$	$42\frac{1}{2}$	n. e.	rain
	2 p.m.	30.	47	48	ſ. e.	do.§

Days.	Hours.	Barom.	Therm. *Fahrenh.* op. air.	Therm. *Fahrenh.* in d.	Wind.	Weath.
17	9 a.m.	29. $9\frac{1}{2}$			n. w.	clou.
	2 p.m.	29. 9	$46\frac{1}{2}$	$46\frac{1}{2}$	n. w.	do.
18	9 a.m.	29. $8\frac{1}{2}$	35	41	n. w.	clou.
19	9 a.m.	30. $\frac{1}{2}$	$30\frac{1}{2}$	$33\frac{1}{2}$	do.	fair
20	9 a.m.	30. $\frac{1}{2}$	31	35	ſ. w.	clou.
	2 p.m.	29. $9\frac{7}{8}$	36	$36\frac{1}{2}$	do.	do.
21	9 a.m.	29. $9\frac{1}{4}$	35	36	n.	do.
	2 p.m.	29. $9\frac{1}{4}$	40	41	n. w.	fair
22	9 a.m.	29. $7\frac{1}{2}$	36	38	n e.	ſnow‖
	2 p.m.	29. 7	36	36	do.	do.
23	9 a.m.	29. 9[illegible]	35	36	do.	clou.
24	9 a.m.	29. $9\frac{1}{4}$	31	34	do.	do.
	2 p.m.	29. $8\frac{3}{4}$	35	$32\frac{1}{2}$	do.	do.
25	9 a.m.	29. 8-	33	36	do.	do.¶
	2 p.m.	29. 8-	35	$33\frac{1}{2}$	do.	do.
26	9 a.m.	29. 9[illegible]	29	31	n.	fair.
	2 p.m.	29. 9[illegible]	33	33	n.	do.
27	9 a.m.	30.	31	33	ſ. w.	clou.
	2 p.m.	30.	36	36	ſ. w.	do.
28	9 a.m.	30. 2[illegible]	32	35	n. w.	do.
29	9 a.m.	30. $6\frac{3}{4}$	29	33	n. *by* e.	fair.
	2 p.m.	30. $6\frac{3}{4}$	34	33	n.	do.
30	9 a.m.		35	36	n.e.b.e	rain ‡‡
	2 p.m.	29. 6[illegible]	40	40	n.e.b.e	do.
31	9 a.m.	29. $5\frac{1}{2}$	40	40	w.	clou.
	2 p.m.	29. 5	45	$43\frac{1}{2}$	w.	do.

FEB.

‡ *Rain in the night.* * *Sharp froſt in the night.* † *And ſun-ſhine.* § *And wind.* ‖ *And wind.* ¶ *Snow in the night.* ‡‡ *And wind;—ſnow in the night, and early this morning.*

FEBRUARY, 1771.

Days.	Hours.	Barom.	Therm. Fahrenh. op. air.	in d.	Wind.	Weath.
1	9 a.m.	30.			n. w.	fair and windy.
	2 p.m.	30. 1 3/5	38	39	n. w.	fair.
2	9 a.m,	30. 1 1/2	31	32	f. w.	do.
	2 p.m.	30. 1/2	40	39	do.	clouds, and Sun-ſhine at times.
3	9 a.m.	30. 1 3/4	35	38 1/2	n. w.	fair
	2 p.m.	30, 1 1/4	39	39	do.	cloudy.
4	9 a.m.	30. 1	29	35	do.	fair
	2 p.m.	29. 8 7/8	42 1/2	42 1/2	f. w.	do.
5	9 a.m.	30. 1/2	33	38	n. w.	fair and windy—Smart froſt in the night.
	2 p.m.	30. 1 1/4	33 1/2	36 1/2	do.	do.
6	9 a.m.	29. 9 1/2	25	23	n. b e.	fair ; intenſely cold this morning.
	2 p.m.	30. 3 3/4	26 1/2	26	n. w.	cloudy.
7	9 a.m.	29. 7 3/4	32 1/2	33 1/2	n. e.	rain ; ſnow in the night.
	2 p.m.	29. 5 3/4	35	35	n. w.	do.
8	9 a.m.	29. 8	32 1/2	35 1/2	do.	fair—much rain & wind at night.
9	9 a.m.	28. 3 3/4	39 1/2	46 1/2	f. w.	cloudy & ſtormy ;—a remarkable high tide.
	2 p.m.	28. 7	39 1/2	41	w.f.w.	cloudy and windy.
10	9 a.m.	29. 7	24 1/2	27 1/2	w.	fair and windy.
	2 p.m.	29. 7	28	28 1/2	do.	do.
11	9 a.m.	30. 1/2	26 1/2	28	n. e.	overcaſt.
12	9 a.m.	29. 3/4	38 1/2	38 1/2	w.	foggy ;—much rain in the night.
	2 p.m.	29. 3 3/4	32 1/2	35 1/2	n. w.	wind and Sun-ſhine.
13	9 a.m.	29. 8 7/8	15	21	do.	cloudy and very windy—Delaware full of Ice.
	2 p.m.	29. 8 1/3	26	26	do.	wind and Sun-ſhine.
14	9 a.m.	29. 8 1/4	25	27	f. w.	overcaſt.
	2 p.m.	29. 7 1/2	35	34	do.	ſun-ſhine.
15	9 a.m.	30. 1/4	22 1/2	28	n. w.	fair.
	2 p.m.	30.	31	31 1/2	do.	do.

The Thermometer marked *Open Air*, is ſuſpended in a North window, about thirteen feet from the ground, the caſement of which ſtands on a jar. That marked {*in doors*,' hangs in an open entry of a ground floor, the door of which fronts the eaſt. The former Thermometer was made by the late ingenious Mr. AYSCOUGH, and compared with one made by the accurate Mr, BIRD; the latter was made by Mr. NAIRNE, and compared with that of Ayſcough, with which it agrees.

FROM the accounts of the weather at Plymouth, in England, in January, 1768, as publiſhed in the 58th vol. of Philoſophical tranſactions, it appears, the greateſt *Cold* there, was on the third and fourth days of that month, when the mercury in the Thermometer fell to 20 degrees. The greateſt heighth was on the 14th, when the mercury ſtood at 49 degrees; wind at S. W.